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**CONSTRUCTION PROJECTS COMMITTEE**  
**THURSDAY, JUNE 25 2009**  
**6:00 P.M.**  
**NASHUA HIGH NORTH LECTURE HALL**

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A meeting of the Construction Projects Committee was held at Nashua High North on **Thursday, June 25, 2009**. Alderman McCarthy called the meeting to order at **6:05 p.m.**

Present: Alderman McCarthy, Alderman Tabacsko, Mr. Hallowell

Also Present: Mr. Mealey, Mr. Smith, Mr. Haas, Alderman Teeboom, Carl DuBois (Harvey Construction),  
Representatives from the Jordan Institute

***DISCUSSION: Jordan Institute Final Report***

**Dick Henry, Jordan Institute**

We're here to share with you the outcome of our work. I got an email from Alderman Teeboom this afternoon expressing disappointment that we didn't have this to you a week ago. The problem was that a week ago we were going pretty strongly in the air sources heat pump direction until we started getting figures back from vendors... which you will see move that pretty much out of the running. So we had to do a reasonable amount of work to re-jigger the priority of the items. The other item Alderman Teeboom brought up was in reference to Schedule A and the one aspect of Schedule A that we haven't yet address is the 3<sup>rd</sup> item on page 1, which was create a phased program schedule that meets the Nashua School district's finance and programming needs. We didn't want to do that until we had a chance to have this meeting and get your input. We have some suggestions at the end that I will make on how we'd like to suggest proceeding from here. And I hope that will answer Mr. Teeboom's questions.

In summary, if you look on page 1, we've analyzed a whole series of measures and come up with several recommendations. The first is the No Cost (or low cost) initiatives. Next is the recommended sequence for EEM (Energy Efficiency Measures). Then through the process of meeting with you over the last few months, the measures we are not currently recommending are: Geothermal systems, Air source heat pumps, biomass heating system and Photovoltaic solar cells.

If you turn to page 7, you'll see an energy use breakdown that's typical of New England education building. On page 8 you can see that the heating and domestic hot water in the Fairgrounds building is 80% and 20% electric. So this building has a very high thermal use. If you look at the graph on page 9, it shows that from an energy standpoint, 90% of the buildings in Vermont K-12 schools work better than the Fairgrounds school. So the energy usage in this building is higher by quite a bit than in other buildings.

If you go to page 10, you see the cost use index. We look at the building here you're in the 40%.

**Alderman McCarthy**

Doesn't that just mean that our cost per BTU is lower?

**Mr. Henry**

Exactly. You are getting a very good deal on natural gas. And 80% of your usage is thermal. So you're getting an excellent deal for what you're paying for gas. And this plays a significant role in what we're recommending as your alternative to select.

**Mr. Hallowell**

I'd like to thank Mr. Mealey and Mr. Smith for the low gas cost.

**Mr. Gaston**

You could bid out your electricity as well, and I'd recommend that you do that because I think right now you're buying it from PSNH.

**Mr. Smith**

As of June 1<sup>st</sup>, we're getting 7.9 cents per kilowatt hour. That's not the delivery. I think with PSNH, that's about 14.

**Mr. Henry**

You're current cost on the kilowatt side is just over 14 cents including delivery.

**Mr. Hallowell**

So is the 7.9 still through PSNH?

**Mr. Smith**

No, that's through a third party.

**Mr. Henry**

Table 3 shows that your annual cost with electric and thermal was about \$83,870. If you'll go to page 10 of Appendix A, you'll see we did energy modeling on a variety of measures here. We looked at each of these items, what they're capital cost would be to implement, what their energy savings were and what they're energy cost savings would be at your current cost rate. Of course the big question is, what is gas going to be in 15 years? There is no way of knowing. So later on in the financial models we put a 5% escalator in for energy inflation as a conservation way. Looking at these on an even playing field, we took each one and looked at it against the total energy use.

*Referred to sides on overhead projector*

**Mr. Henry**

The first thing we tackled was the air ceiling of the shell. It's very clear that this building is quite leaky between the wall and the ceiling. This measure is not particularly expensive. It's \$48,700.

**Mr. Gaston**

If you flip to the Building Shell Analysis on page 7, you'll notice they give a range. Every item has an approximate cost. The product that we passed around last time for the slab insulation is what we gathered pricing on. What we had the contractor take a look at was 16" below grade to above the slab line and then a flashing that capped it all. The price for that was \$46,000. It did not include this work at the locations where pavement hit the building. We did not choose to break up the pavement and repave on those areas. But it includes over 900 lineal feet of insulation around all of the perimeter where there's dirt. That went into the pricing of that item.

**Alderman Teeboom**

Looking beyond the mechanical into structural... I guess Harvey hasn't looked at this data. How do we validate this against our Construction Manager?

**Mr. Henry**

I think there is a distance between cup and lip in terms of what we estimate and what you get back once you bid it out.

**Mr. Gaston**

I've spent my career in construction and am a validator. I understand pricing and how subs work and what they leave out. It's my job to ensure that what they leave out, I put in... which is what the gentleman sitting to your right is also poised to do. So we are both on the same page. We try to be as real as we possibly can be.

**Alderman McCarthy**

We only have about 20 minutes until Joint Special and are clearly not going to take any on this... having only seen it tonight. It occurs to me that what we've done is to deal with the energy loss issues, but I'm not convinced that

we've addressed things like the condition of the delivery system, the piping... we're basically looking at continuing to use the existing unit ventilators in this scheme...

**Mr. Henry**

No, we're not.

**Alderman McCarthy**

So I guess I'd like to see those at an overview level so we can go off and understand that. I'd certainly like to understand Carl's reaction at our next meeting as well. In regard to the details, I understand you're looking at all the missing pieces but I want to make sure that we're looking at sequencing in this building.

**Alderman Teeboom**

When this is done, are we going to have Harvey Construction to validate these construction numbers?

**Alderman McCarthy**

I'm going to ask them to react to it at our next meeting and we'll figure out what we're going to do from there.

**Mr. Mealey**

I'm just curious... when you do these thermal analyses, is it a consideration you have to take about the path of least resistance... that what will show up is the path of least resistance for the air to escape, but if you seal that up there may be other places that it may escape?

**Mr. Henry**

Yes, there's no question about that. You're right. And one of the things we want to recommend at the end of this is that we think there are some additional insulation steps that could be taken that would solve some of those problems that don't make this initial cut for economic reasons. So this is a combination of both the energy model and the financial model. The next slide is just glazing and door upgrades. We looked at the windows and decided not to do anything with them. Then we get into the ventilation upgrades and that's the energy recovery ventilators (7). That will move us a long way increasing the comfort level in the room without air conditioning. When we walked away from the air source heat pumps, we wanted to do something to drop the humidity in the building.

**Alderman McCarthy**

We're putting one these in each wing... how are we distributing heat to the individual classrooms?

**Mr. Henry**

Replacing the distribution piping, moving all the steam to hot water, sealing off the unit ventilators (taking them out) and putting in radiant panels there instead. We still think you have to replace all the piping. This is only affecting maybe 50-60% of the building, because that's the only portion that's steam. Now we go to lighting improvements and lighting controls, saving close to \$7,000 a year

**Gary O'Connell**

We have not incorporated any rebates for any of this work at this point. One of the reasons is that we've had a number of projects where PSNH ran out of money.

**Mr. Henry**

With all of these assumptions there are 2 things we haven't done. We haven't included any rebates or any code and end of life issues. The boilers have to be replaced. Period. So for this initial estimating, we've assumed that everything is coming off the energy efficiency. So in the heating upgrades, replace both boilers and we're recommending condensing high efficiency boilers with outdoor reset, etc. A lot of these have a lot of controls in there already so that decreases the control costs. And that's \$491,000 to replace the heating system and saves you about \$9,000 a year. The last item is the DDC Controls, switching out the pneumatics and putting in electronic systems.

Now, here is the summary. Basically on the electric side we get about a 30% savings and on the thermal side we get about almost 43% savings for a total savings of about 40%. That's your overall usage reduction. And because you're getting such a good deal on gas, your cost reductions are 37%.

We looked at the overall project as if all of the costs were on the shoulders of energy savings only. We assumed \$1.24 for gas, 14 cents for electric, 5% inflation rate, borrowing costs at 5% (you probably can do better than that). We have not put in the school reimbursement figures and we haven't put in any rebates or end of life and code stuff... which I'm about to do.

The initial project comes in about \$1.2 million. Its internal rate of return is just 2.7% and it has a negative net present value of \$359. So if you were just working on this you would probably not do this if you were just working on saving energy. But we're saying that the boilers, the distribution system and the ventilation are all things you've got to do anything.

**Alderman McCarthy**

The \$359,000 is essential our cost to take care of code and maintenance issues.

**Mr. Henry**

Right, but we've figures that at about \$709,000. Because we took \$300,000 of the \$498,000 of the heating system and said that would be an HB Smith run of the mill with the distribution system replaced. Then we put all the ERV dollars in because that's a code requirement. And \$430,900 as the energy related measures. So we recommend that you insulate the entire shell of the building, but from the outside. We'd like to continue to work with you for the next couple of weeks and come back to you with some prices and stuff on how to do that. We just assume keep that thermal mass in the building and come up with some kind of outside surface that you'll be comfortable with. John has run some numbers on this and we think it's in that \$400,000 to \$430,000 level.

So now the total cost of the project goes to about \$1.6 to \$1.7 million; the energy efficiency components of it still have a good return and you probably will pick up the things you had to do anyway out of the building state aid.

**Alderman Teeboom**

Which of the EM's is the outer shell?

**Mr. Henry**

It's not on there. It's another measure that we took out, because at \$400,000 it was at a 50 year pay back or something. But now that we show what the savings are on just the energy components, we think it's a wise thing to put back in. You would definitely save more energy.

**Mr. O'Connell**

We investigated 3 options. One of which is addressed in that building shell report in the appendices which was to insulate with foam on the inside. Well that's not very practical. We also looked at filling the cavities of the block. The problem with that is the concrete that's left is just a bridge in terms of thermal heat transfer. So the savings wasn't there. So we looked at skimming the outside of the building, which makes a lot more sense. We still have to chase that.

**Mr. Henry**

We think you have a pretty viable project here and it's considerably less expensive than some of the alternatives that we looked at, which gives you this option to do more on the energy side. There's still more investigating we can do on the distribution system. We'd like to work on this for a couple more weeks (with grant money) and help you figure out some of these additional details. And if you agree with us that because of our reasoning, wrapping the building really is worth exploring and seeing what that would cost and how much that would further improve the efficiency of the building we will think is a good idea.

**Alderman Teeboom**

You brought up windows and we have a lot of windows, which let out heat.

**Mr. O'Connell**

We investigated replacing the lower panel, because you're not getting any benefit out of that. But the problem we came up against was the square footage of that strip of call wall was so small compared to the overall square footage of wall that it really didn't have a big impact.

**Alderman Tabacsko**

What you're recommending tonight is approximately \$800,000 worth of improvements in total and then to consider the building wrap at another \$400,000+ for a total of \$1.2 million.

**Mr. Henry**

No, we're recommending \$1.2 million and then another \$400,000 on top of that. But of the \$1.2 million, \$700,000 is not related to energy efficiency... that's something you had to do anyway.

**Mr. Hallowell**

So if you do the exterior insulation, does that remove any of the other EEM's that you talked about? Specifically between the roof and the wall...

**Mr. O'Connell**

No, I would say there's a difference between air sealing and insulation. A lot of the work that we were going to do on the inside was air sealing and you're trying to create an air tight connection. There are areas with bad insulation that we would pull that out and foam it. So you are getting a benefit of both insulation and air sealing at that particular point. But the benefit on the inside is mostly air sealing.

**Mr. Hallowell**

It sounded like if we use the air handlers that would have given you easier air conditioning?

**Mr. O'Connell**

The only difference there is we still need the ERV's with the air source heat pumps because they aren't delivering fresh air. But we wouldn't have needed the dehumidification. In this package, we're saying you can put dehumidification in the ERV's and do away with air conditioning. To get the moisture out of the space is probably going to suffice, particularly when the building is sealed.

**Mr. Hallowell**

My concern is that the education is looking more and more like longer school years. So is it reasonable to make that investment at this point.

**Mr. Gaston**

We did think about that. It's one of the compromises you make with this particular system. If you really feel strongly about AC, then you would have to look at the most efficient way of providing that in a building that's as awkwardly shaped and configured as this one. But if that is a strong opinion, then we should look at that.

**Alderman McCarthy**

Would AC require different delivery duct work?

**Mr. Gaston**

The Jordan Institute has tried to keep systems separate from each other. Heat, AC and ventilation. So the AC system would be a separate system. You really can't use an ERV type system with cooling because of the dynamics of how air changes through the box.

**Mr. O'Connell**

If you tell us that you really want full AC in the whole building, that's going to throw us back, I believe to the air source heat pumps. The alternative is gas with a separate AC system that we would have to price out. That's expensive and is not in here. When we saw the difference in the capital costs and the operating costs that you were getting with such good gas prices... if those hold and you want to go with full AC then we have to probably go away from the gas system or have an AC and a gas system.

**Mr. Hallowell**

I never said I feel strongly, I'm just trying to understand the pros and cons. We can always add an AC system after if we wanted to.

**Alderman McCarthy**

What you may be doing is, because we'd have to disturb the ceilings to put in duct work twice, we'd have duplicated costs.

**Mr. O'Connell**

Right now the school has no return. What is your sense on the AC? Can you give us a hint?

**Alderman McCarthy**

I'm probably a greater fan of AC than even Mr. Hallowell. I actually think that dehumidification is the most important piece of that. But if we're going to use the building year round, it could be excessively hot in July and August. I'd have a tough time going back to the air source heat pumps. That's 40% of the project cost if we were to do them and basically all we're getting for that is AC. So I'd be reluctant to go back to that. If there was a way we could figure out how to minimize the cost of adding it later on, I'd be interested in hearing those options. If there are things we could do differently for slightly more cost now that would make it easier to go back and do the retrofit later...

**Mr. Gaston**

For instance putting the primary duct runs in at the same time that we're doing the ERV duct work.

**Mr. O'Connell**

Are you saying you want to leave it open to go to a roof top AC system, in which case we'd put the duct work in now... or are you saying you want to reserve the option to go with a heat pump?

**Alderman McCarthy**

I'm not particularly in love with going with heat pumps for that reason alone. It looks like with our basic energy costs, heat pumps in general are not good return for us. If we could put in the major duct work at a fairly small incremental cost, so we could put in roof top AC when we get there, that would be an interesting option to look at.

**Mr. Hallowell**

I'd like to see the numbers.

**Alderman McCarthy**

I would like to see the building envelope number and the duct work number. At the next meeting I'd like to discuss those two things, and whatever Mr. DuBois can come up with that we forgot.

**Mr. DuBois**

If you're considering adding AC to the building if you're going to go just ventilation or AC, there's a big difference in duct size. So if you are going to do it, the question is how are you going to do it? Because you have absolutely no plumbing space in the building. Our thoughts were to run in above the roof line in the wells. Unless you're going to get rid of the cathedral ceiling in the older classroom and go to a flat ceiling.

**Mr. Gaston**

We actually toyed with that idea and that would help with your heating too.

**Alderman Tabacsko**

At what factor... doubling or tripling the cost of natural gas, would it make natural gas start to lose out to some of these other options?

**Mr. Henry**

I think with the recent increase in gas in the US, we may have a lot more gas in this country than we ever thought we did. I think it's always going to beat oil. They used to track right together, but they don't anymore. Forty-four percent of all the electricity in the NE area is generated by gas. So if the price of gas goes up, the price of electricity is going to go up. And as we get a cap and trade program in place, the price of coal is going to become much more expensive. So I think you're going to see more coal plants shifting to gas. So in that case, gas and electricity are going to track together anyway. So when is your next meeting?

**Alderman McCarthy**

We haven't set it up yet.

**Mr. Henry**

The thing left on the schedule is the financing phasing. That was one of the things we said we would do on Exhibit A. Until we choose which measure you want to go with and how many years you want to take to do this and figure in the repaid school assistance, etc. we can't fully help you see the financial side.

**Alderman McCarthy**

With the numbers we have now, we have cash in the account to pay for it now.

**Mr. Henry**

So we will continue to work on the skin and we'll try and get you some answers on the AC. And if Harvey would chat with us, we would be delighted to talk to you.

***APPROVAL: JORDAN INSTITUTE INVOICE***

**ALDERMAN TABSKSCO MOVED TO APPROVE AN INVOICE FROM THE JORDAN INSTITUTE IN THE AMOUNT OF \$5,850.88.**

**SO VOTED.**

**Alderman McCarthy**

Since this is your last meeting with us, I want to thank you (Mr. Mealey) for your service to this Committee and the City.

**Alderman Tabacsko**

I think the Committee is unanimous in that.

**Mr. Hallowell**

I think so.

Mr. Hallowell moved to adjourn. **So voted at 7:20 p.m.**

*Submitted by Jacki Waters*